

# Health Resources Management and Physician Control in a San Francisco, California, Hospital

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The continued escalation in health care spending has caused money to become an increasingly limited resource, which may eventually affect the ability of health professionals to provide complete health care services. Health care payers have stressed efficiency and the appropriateness of health care measures and are putting greater financial pressures on health professionals by making them more accountable for services provided. Hospitals and physicians must take a more active role in monitoring health care delivery and work together to improve performance efficiency. Efficiency can be gained through a comprehensive program that emphasizes high-quality care and the effective use of health care resources. The Health Resource Management Program is a model for carrying out this function that integrates data analysis and physician input and education.

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As health care spending continues to escalate, health care purchasers will continue to pursue alternatives designed to reduce their health care burden. In the early 1980s, the first round of alternatives was introduced with measures aimed at reducing hospital expenditures by direct utilization controls and reimbursement limitations. Government-mandated payments by diagnosis (Medicare) and payments per diem (Medi-Cal) were the new payment buzzwords in the early 1980s. In 1980 \$248 billion was spent on health care services. In 1985 health care spending nearly doubled to \$423 billion, consuming almost 10% of the Gross National Product.

Following the federal government's lead, the next wave of alternatives came from the industrial sector, which marked the beginning of the managed care era. Health maintenance organizations, preferred-provider organizations, exclusive-provider organizations, and individual practice associations became the buzzwords of the late 1980s. If direct controls could not reduce health care spending, maybe the establishment of a retail-like competitive marketplace would do better. In 1989 more than \$600 billion was spent on health care services, consuming nearly 12% of the Gross National Product.

The decade of the 1990s brings us the third stage of alternatives to reduce health care spending. Health care purchasers have now begun to take a more active role in scrutinizing the actual process and outcome of health care delivery, demanding to know the indications and justifications for health care actions and interventions. Insurance companies have begun to deny payments for medically unnecessary services or to retrospectively demand that fees for unwarranted care be repaid. A new medical enterprise has sprouted of corporations whose sole function is to "second-guess" physicians' orders and hospital-related services through direct chart reviews and bill audits. These companies contract directly with health-care purchasers in an effort to reduce pay-

ments for unsubstantiated charges (A. Miller, "Second-Guessing Doctor's Orders," *Newsweek*, May 23, 1988, pp 44-45; S. Findlay, "Looking Over the Doctor's Shoulder," *U.S. News & World Report*, January 30, 1990, pp 70, 73). As these claims analysis and data information systems proliferate, more and more insurance payers are leaning toward selective contracting with "more efficient" health care providers.<sup>1</sup> Efficacy, efficiency, appropriateness, and accountability have become the buzzwords of the 1990s.

With some predictions that health care spending will reach the \$1.5 trillion mark by the year 2000, money will become even more of a limited resource, and more drastic alternatives are predicted for the future. At one end of the spectrum are the proponents of universal health insurance who feel that the only way to control health care costs is to nationalize the entire system. At the other end are the proponents of health care rationing who favor a system of direct limitations on health care access. The state of Oregon has already instituted such a system for its indigent population wherein payment coverage for medical services is limited, based on a ten-point medical priority system (M. Cannel, D. Wyss, "Rationing Medical Care," *Time*, May 15, 1989, p 54). California had considered its own rationing system for Alameda County but subsequently decided against implementing it.<sup>2</sup>

With this information in mind, let us focus our attention on the new priorities in health care. With money becoming more of a limited and restricting resource, physicians' objectives are to take the lead in managing health care resources in the most effective manner possible in an effort to maintain patient access and provide appropriate cost-efficient, high-quality care.

We present an example of how this can be accomplished in the hospital sector. Using hospital economics as a measurement guideline, we can see how changes in behavior can affect financial performance. While improved financial per-

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formance can be attributed to several different factors, in the context presented in this article, it will be used as an indicator of greater efficiency of care.

### Local Hospital Effects

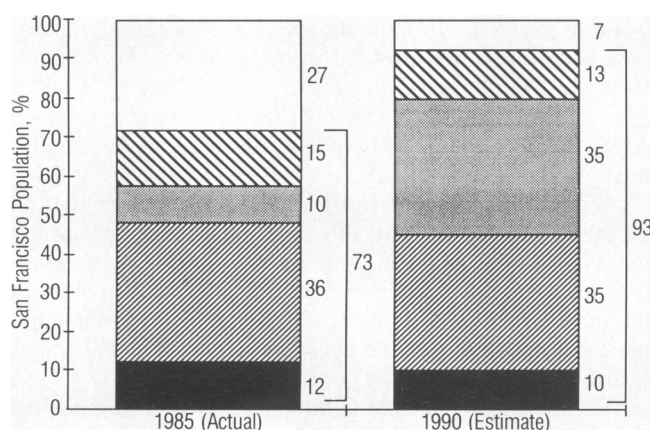
Utilization restrictions, reimbursement limitations, and managed care alternatives have considerably affected the local San Francisco health care system. With 11 hospitals left in a small geographic area, and with a growing dominance of the Kaiser-Permanente system (approaching 30% of the northern California market), all hospitals are suffering the consequences of reduced market share and dwindling inpatient revenues. Over the past ten years, several hospitals have been forced to close or to otherwise lose their autonomy through various affiliations or mergers, and this trend is likely to continue. In an effort to maintain financial viability, hospitals have had to take serious steps to maintain revenues. By looking at the economic equation,

$$\text{Net Income} = \text{Revenues (Price} \times \text{Volume)} - \text{Expenses}$$

the reasons why hospitals are in such a precarious financial situation become apparent. Hospitals are limited in their opportunities to increase total revenue by utilization restrictions and to increase volume by competition. Reimbursement limitations and other forms of discounted care limit the ability to increase prices. A reduction in expenses has primarily been approached by trying to reduce overhead, limiting full-time-equivalent employees, or instituting various cost-containing programs. The only approach left is to reduce expenses by improving the efficiency of operations. The efficiency of operations can be improved through the various components of health care delivery. Admissions, discharge, lengths of stay, diagnostics, and therapeutics are all various components under physicians' control. Improving efficiency in these areas can have a profound effect on the bottom line. The following example will explain this concept in more detail.

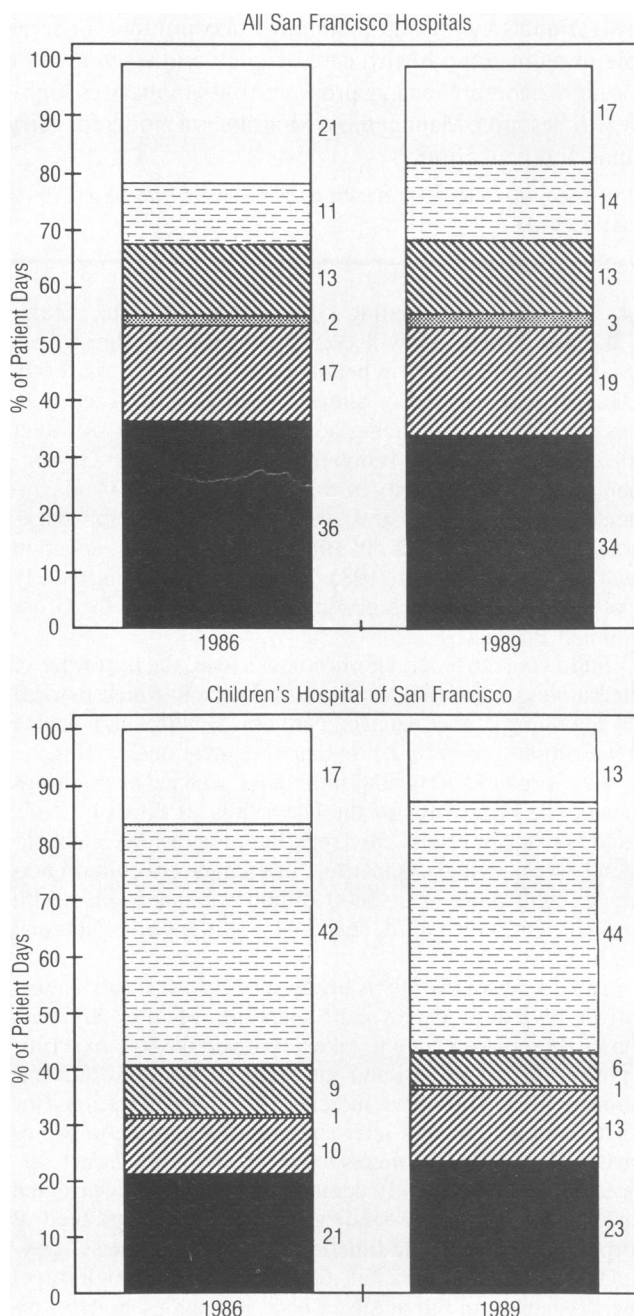
### Case Example

Children's Hospital of San Francisco is a 467-bed non-profit, acute care adult and pediatric hospital located in metropolitan San Francisco. Like most hospitals in the city, most of its patients are covered by an insurance payment system



**Figure 1.**—The graphs show the shift to managed care in the San Francisco Bay Area, 1985 to 1990 (from J. X. Reynolds and Company, *Marketplace Analysis*, July 30, 1986, San Francisco, California). □ = fee-for-service, ■ = Medicare (excludes Medicare population that will shift to capitated programs [PPOs/HMOs]), ▨ = preferred-provider organization (PPO) or other health maintenance organization (HMO) (includes 20% of Medicare patients who will shift to capitated programs [PPOs/HMOs]), ▩ = Kaiser-Permanente, ■ = Medi-Cal

that pays something other than full fee-for-service charges (Figures 1 and 2). In fact, 80% of the patients are paid either by the diagnostic group (Medicare), per-diem payments (Medi-Cal [California's Medicaid], health plan), capitation, or other forms of negotiated fee-for-service discounted plans. When the total charges are compared with the actual amount of monies received, there is a substantial discrepancy between the two categories. This discrepancy can be called "contractual deductions," and for different hospitals this could add up to as much as 30% to 60% of charges depending on the payer mix. A contractual deduction of 50% means that the hospital collects only 50 cents on each dollar charge. This implies that for most payer categories, it is in the hospital's



**Figure 2.**—The graphs show the payer mix trends in San Francisco only, based on patient days (from the West Bay Hospital Patient Discharge Study, 1986 and 1989, Children's Hospital of San Francisco Case-Mix Library). □ = commercial, ▨ = health maintenance organization or preferred-provider organization, ▩ = other, ▨ = medically indigent adults, ▨ = Medi-Cal, ■ = Medicare

best financial interest to provide only the minimal services necessary in the most expedient manner possible to maximize the potential for financial gain.

Unfortunately from a purely economic perspective, hospital financial incentives are often different from physicians' financial incentives because physicians are still predominantly paid by the customary fee-for-service system. Table 1 shows that a hospital is at various levels of financial risk (risk of nonpayment for services provided) for different payer categories if an admission is "not approved" (Medicare, Medi-Cal, other), if the lengths of stay are long (Medicare, capitation), if there are "unapproved" hospital days (Medi-Cal), or if a high intensity of resources is used (Medicare, Medi-Cal, capitation). On the other hand, physicians are at minimal risk for services provided because most of the insurance categories still reimburse physicians on a fee-for-service basis and, for the most part, physicians still get reimbursed for services provided even when hospital payments have been denied.

It is difficult to ask physicians to treat hospital inpatients differently according to their insurance status. Our approach has been to try and treat all patients as efficiently and effectively as possible in the interests of high-quality, cost-

efficient care. The medical resource management model described herein reflects efforts to establish a mechanism to monitor patient care activities in an attempt to improve their efficiency. We have translated measurements from quality control, utilization review, and resource consumption into economic indicators as a way to measure and compare performance.

### Hospital Model

The medical resource management model draws information from quality assurance, infection control, and utilization management and coordinates this information with input from nursing personnel, department managers, administrators, and physicians into one centralized program designed to produce high-quality, cost-effective care. Regarding quality assurance and infection control, the emphasis is to identify unwanted trends or variances in medical care that substantially affect medical quality and then to develop strategies to reduce these events through a process of monitoring and control. Using postoperative infections as an example, the model involves taking proactive measures to reduce the incidence of postoperative pneumonias, surgical wound infections, or urinary tract infections that not only improve quality of care but also save the additional costs of treating these complications, which can range between \$3,000 and \$30,000, depending on the severity of the problem.<sup>3</sup> Regarding utilization management, assuring the necessity of admissions, expediting treatment plans, and reducing lengths of stay can have a profound effect on financial performance. Reducing lengths of stay by even one day can save a hospital as much as \$1,000 per patient in nonreimbursed charges. Utilization management can be extended to include monitoring the use of ancillary resources. Ancillary resources include laboratory services, pharmacy, radiology, nuclear medicine, respiratory therapy, physical therapy, central supply, or any other service ordered by a physician as an additional item. In financial terms, these resources can be referred to as variable services—to distinguish them from the fixed services associated with hospital room and nursing—and, depending on the type of admission, can account for as much as 50% of total hospital charges. Considerable efficiency can be gained by maximizing the efficient use of such resources.

### Case Study

The goal of developing such a program is to monitor specific hospital-related medical services with the overall intent of improving efficiency of care. Each hospital will want to focus on areas that are most appropriate for its own individual needs. Priorities may be set by analyzing high-

TABLE 1.—Economic Incentives by Payer Mix

Economic Incentive	Admission	Length of Stay	Resources Used
<b>For Hospitals</b>			
Full charge*	+	+	+
Discounted charges†	+?	+?	+?
Payment per case‡	+?	—	—
Payment per diem§	+?	+??	—
Capitation	—	—	—
<b>For Physicians</b>			
Full charge*	+	+	+
Discounted charges¶	+	+	+
Payment per case#	+?	+	+
Payment per diem**	+	+?	+?
Capitation  ††	—	—	—
+ = desirable/increase, — = undesirable/decrease			
*Reimbursed for services provided. For physicians, fee-for-service.			
†Preferred-provider organizations (PPOs): Reimbursed on percentage of charges; the question is whether discounted reimbursement is enough to cover costs.			
‡Prospective payment (diagnosis-related groups [DRGs]): Fixed payment, with the emphasis to do less; the question is that it is subject to "admission approval."			
§Medicaid: Paid by the day, with the emphasis to do less; the questions are that it is subject to "admission approval" and payment may be only for "medically necessary" days.			
Payment per enrollee (health maintenance organizations [HMOs]): Money is paid "up front," with incentive to do less.			
¶(PPOs) Same incentives as for fee-for-service.			
#Medicare (DRGs): Physicians are reimbursed for services provided; the question is that Medicare may deny payment for unnecessary services.			
**Medicaid: Physicians are reimbursed for services provided; the question is that Medicaid may deny payment for unnecessary services.			
††Physicians may be on fee-for-service reimbursement with hospital on capitation.			

TABLE 2.—Diagnosis-Related Group (DRG) Summary Averages, 1987 (Before Study)

DRG No.*	Patients, No.	Average Length of Stay, days	Average Age, years	Charge/Patient, \$								
				Gross Revenue	Room	Pharmacy	Laboratory	Surgery	Physical Therapy	Central Services	X-Ray	Other Ancillary Charges
209.....	129	10.56	66	17,756	5,878	1,036	733	7,381	633	1,158	267	670
210.....	48	11.71	71	16,302	6,762	1,340	1,492	3,186	586	1,085	798	1,053
211.....	15	8.93	35	11,022	4,906	973	397	2,953	379	795	372	247
212.....	19	4.68	9	7,421	2,693	539	263	2,985	89	319	279	254
Total/Average...	211	10.18	60	16,016	5,723	1,056	839	5,716	556	1,040	396	690

\*DRGs 209 through 212 refer to Major Joint Procedures.

volume or high-cost admissions, looking at categories by profit or loss, or focusing attention on special projects or known areas of concern. In our case, we decided to do a focus study on diagnosis-related groups (DRGs) 209 to 212, Major Joint Procedures.

Table 2 lists DRGs 209 to 212 and summarizes the 1987 prestudy results according to charges derived in the different ancillary resource centers. The population studied includes all payer categories but is presented under the DRG categori-

zation for convenience and familiarity. We focused on hospital charges rather than costs because charges are the standards for reporting and charge information is more readily accessible. While we appreciate the discrepancy between costs and charges, charges still give us a fair representation of resource consumption, and we can avoid the issue of justifying hospital costs. Table 3 summarizes the same results by individual physicians where behavior patterns can be compared and analyzed on a physician-to-physician basis.

TABLE 3.—Physician Summary Averages, 1987

Attending Physician	Patients No.	Average Length of Stay, days	Average Age, years	Charge/Patient, \$								
				Gross Revenue	Room	Pharmacy	Laboratory	Surgery	Physical Therapy	Central Services	X-Ray	Other Ancillary Charges
1.....	2	9.00	70	17,444	4,924	807	950	7,337	618	1,076	218	1,514
2.....	15	8.87	59	15,881	5,042	1,157	896	6,170	545	1,000	487	584
3.....	2	6.00	31	6,256	3,299	395	84	2,187	0	245	0	46
4.....	10	10.80	69	17,416	6,153	1,397	886	6,342	599	1,176	255	608
5.....	6	10.00	77	15,451	5,909	991	1,337	4,168	574	842	774	856
6.....	51	10.27	64	17,310	5,652	990	771	7,151	610	1,196	288	652
7.....	14	9.21	59	12,964	5,155	846	615	4,085	497	819	436	511
8.....	9	16.44	66	22,693	9,251	1,635	1,224	5,924	1,109	1,506	789	1,255
9.....	15	10.73	62	19,050	6,261	1,357	1,072	7,106	519	1,739	299	697
10.....	1	6.00	78	9,135	3,300	161	414	3,091	336	552	810	471
11.....	28	9.29	57	14,297	5,111	860	587	5,456	516	937	287	543
12.....	14	6.86	15	11,292	4,039	750	388	4,908	210	498	305	194
13.....	12	9.50	62	14,312	5,284	972	802	4,754	480	836	522	662
14.....	3	14.33	68	20,267	7,937	1,063	1,785	6,223	637	1,152	593	877
15.....	11	11.18	62	16,227	6,150	1,148	719	5,186	505	894	474	1,151
16.....	7	13.57	83	19,779	8,316	1,628	1,959	3,167	775	1,231	906	1,797
17.....	8	11.13	62	13,903	6,075	1,277	1,007	3,483	607	514	382	558
18.....	1	12.00	74	19,411	7,425	916	1,629	5,479	588	1,933	367	1,074
19.....	1	11.00	80	15,728	5,775	481	590	7,199	511	832	0	340
20.....	1	5.00	42	9,184	3,015	505	486	4,294	231	301	173	179
Total /Average ..	211	10.18	60	16,016	5,723	1,056	839	5,716	556	1,040	396	690

TABLE 4.—Surgery Summary of Diagnosis-Related Group 209, Hip and Knee Procedures, by Attending Physician

Physician	Patients No.	Total Surgery Charge/Patient, \$	Surgery Charges Breakdown, Charge/Patient, \$				
			Surgery	Anesthesia	Recovery Room	Prosthesis	Tray/Pack/Supply
1.....	2	7,337	2,229	423	575	3,278	831
2.....	10	7,285	3,044	438	399	2,694	711
3.....	0	0	0	0	0	0	0
4.....	9	6,581	2,421	398	328	2,612	821
5.....	1	6,382	1,720	351	361	3,132	818
6.....	42	7,949	3,039	448	436	3,109	918
7.....	6	5,882	1,838	360	255	2,573	856
8.....	5	7,441	2,657	407	403	3,103	871
9.....	12	7,912	2,301	458	287	3,501	1,366
10.....	0	0	0	0	0	0	0
11.....	18	6,999	2,619	379	374	2,782	845
12.....	4	9,392	4,464	464	346	3,565	553
13.....	6	6,759	2,468	353	223	2,902	813
14.....	2	8,034	4,588	433	336	3,810	772
15.....	7	6,375	1,830	340	424	2,946	834
16.....	1	6,418	2,055	445	305	2,950	663
17.....	2	6,933	2,542	320	347	2,935	789
18.....	1	5,479	1,540	220	401	2,675	643
19.....	1	7,199	2,263	370	442	3,770	354
20.....	0	0	0	0	0	0	0
Total/Average .....	129	7,381	2,719	414	378	2,985	886

This macro-analysis can help pinpoint areas for further study. Each department was analyzed in more detail to see if efficiency could be gained by improving performance in these areas. In the pharmacy, efficiency could be gained by using more cost-effective antibiotics and analgesics. In the laboratory, efficiency could be gained by more effective ordering patterns that encouraged the use of more standard laboratory profiles or substituting less costly tests (for example, hemogram vs a complete blood count, blood type and screen vs blood type and cross) when clinically acceptable. The greatest area for improvement was in the surgery department. Table 4 analyzes DRG 209 (Hip and Knee Procedures) and provides a more comprehensive look at the different components that make up the surgery center. Each of these components was studied in detail in an effort to determine where to focus our efforts to improve efficiency in care. The biggest ticket item was in the prosthesis charge per patient. By analyzing how prostheses are used, we found that efficiency could be gained by encouraging the use of standard rather than custom-ordered prosthetic devices. Table 5 lists charges for total hip and knee prostheses, in which the differ-

TABLE 5.—Orthopedic Prosthesis Comparison

Cost Range	Cost of Prosthesis, \$	
	Total Hip	Total Knee
Low range .....	2,350	2,350
High range .....	3,100	2,950
Revision .....	3,400	3,650
Custom .....	5,000-6,000	5,000-6,000
Plus Additional Costs for Custom Work		
Usage fee .....	250	250
Freight .....	100	100

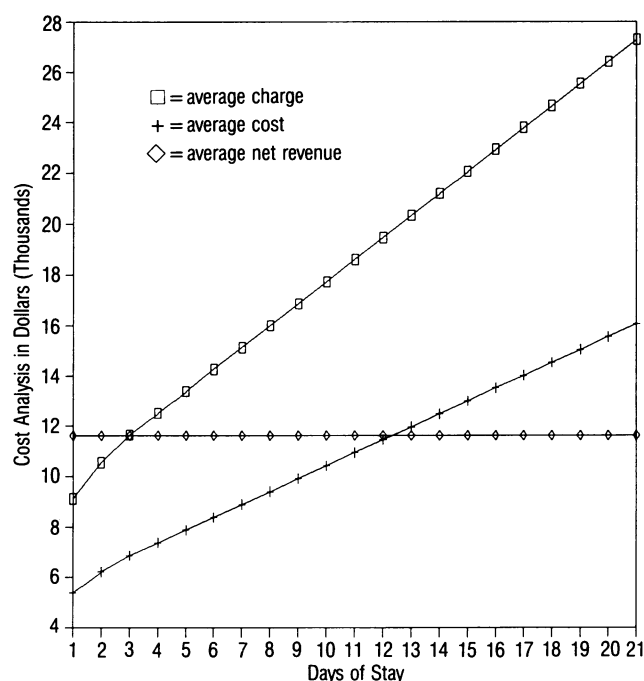


Figure 3.—The graph shows the break-even analysis for a total hip procedure (diagnosis-related group [DRG] 209), January 1, 1987, through December 31, 1987. Average length of stay for DRG 209, 10.6 days; average total charge, \$17,756; average operating cost, \$10,451; average net revenue, \$11,612; average fixed charge per case, \$5,878 (33%); average surgical charge per case, \$7,381 (42%); average variable charge (excluding surgery) per case, \$4,497 (25%).

ences can amount to several thousand dollars in hospital charges. Noting the large amount of physician variance in this area, we found that encouraging a more standard use of prosthetic devices produced a substantial financial savings without a compromise in the overall quality of care.

The cumulative results from DRG 209 are plotted in Figure 3. This graph is intended to illustrate the potential financial impact of the suggested interventions. Although the graph describes results for DRG 209, all charges are the same regardless of insurance classification. The average net revenue is that received from all payer classes and is plotted as a straight line. The average charge line indicates the total cumulative charges for medical services. The average cost line indicates the actual cumulative cost to the hospital of providing such services. The contractual loss portion indicates the difference between total charges and net revenue received. Notice that after day 2, the total charges exceed actual reimbursement. The net profit portion indicates the difference between actual costs and revenues received. Notice that the hospital continues to make a profit through day 11. Profit can be maximized by discharging patients before day 11, which moves the cost line to the left. (In our hospital, discharge can be expedited because there is an on-site skilled nursing facility.) Profit can also be maximized by improving the efficiency in which services are ordered, which extends the net profit area by lowering the average cost line toward the baseline.

These are but a few examples of how this type of process has been applied to improve efficiency in the Orthopedic Department. An analysis of other medical departments and services has shown similar results.<sup>4</sup>

### Physician Involvement

For the program to work, physicians must actively participate. Although the health care payers want to reduce costs and eliminate the waste and nonessential components of medical care and the hospitals at financial risk want to improve their efficiency in health care operations, it is physicians who have the ultimate responsibility for providing ongoing quality medical care. We have taken the approach of actively involving staff physicians by encouraging their input and recommendations early in the process.

The resource management program involves a five-step process. The first step is the information-gathering and data-analysis phase, looking at the data as they relate to the specific needs of an individual hospital and selecting appropriate areas for study. This leads to the second phase, which requires the identification of priorities and the setting of goals and objectives appropriate to accomplish the desired tasks. The third step involves the presentation of the data to the target group. With physicians as the primary target group (attending physicians and house staff), all the pertinent information is shared with the group and physician participation and involvement are actively encouraged in an effort to help develop appropriate alternatives and guidelines for improving efficiency in care. The fourth step is the educational component, and for the physician group the key lies in physician-physician interaction and education. Many of the objectives outlined can be achieved by simply providing physicians the information and encouraging behavioral change through peer group interaction and the exchange of ideas. Education is conducted in a structured, ongoing manner. Vehicles for



education include grand rounds, department meetings, and a regular series of lectures on economics offered to both residents and attending staff. These efforts are reinforced through individual discussion. It is not enough simply to describe the merits of good efficient care; constant interaction, follow-up, and education are required to produce the desired results. Other groups who also benefit from the education process include nursing, administration, department managers, and other interested hospital personnel. The fifth step is to monitor the results and revise accordingly.

The overall goal of the program is to share information, encourage input, and develop alternatives for improving the efficiency of care. The concept was developed from the perspective that cost-efficiency, efficacy, and high quality of care go hand in hand. Efficiency means not doing more and not doing less than is clinically warranted, and quality is gained by not subjecting patients to unnecessary medical interventions. The program has the benefit of responding to the demands of the "everybody-else-who-is-looking-over-our-shoulders" phenomenon but also provides an opportunity to develop internal controls over the system rather than reacting to externally developed priorities. From a more global perspective, physicians need to take a more active role in recognizing the importance of the efficient allocation of

resources, in the interests of having more resources remain available for total patient care.

### Physician Behavior

As mentioned earlier, physician participation is the key to the program's success. Because it is physicians who decide which tests to do, the first goal is to improve physician behavior. For many reasons, physicians tend to order a lot of services. In the interests of providing high-quality care, they have been trained throughout medical school and residency programs in a philosophy that equates quantity with quality, and they like to use all the resources at their disposal before reaching a final diagnosis. Kassirer calls this the never-ending quest for diagnostic certainty.<sup>5</sup> If it costs \$500 to reach a diagnostic confidence level of 95%, can we continue to afford to spend an additional \$500 to increase the diagnostic confidence level to 96%? Other reasons for ordering large quantities of tests include the lack of economic incentives for efficiency propagated by the fee-for-service reimbursement system and defensiveness in reaction to the fear of malpractice suits. Even with all these obstacles, there is still room for improvement.

Several recent studies have indicated that more than \$125 billion is spent each year on "wasted" medical services

TABLE 6.—Orthopedic Diagnosis-Related Group (DRG) Financial Trend Analysis of an Inlier Population,\* 1987 and 1988

Population and Services	Hospital Charge		% Change From 1987	Population and Services	Hospital Charge		% Change From 1987
	1987	1988†			1987	1988†	
Total Population				DRG 211 Hip/Femur§			
Patients, No. ....	164	187	14.0	Patients, No. ....	13	29	123.1
Average length of stay, d. ....	10.1	8.7	-13.9	Average length of stay, d. ....	10.6	8.7	-17.9
Average age, yr. ....	64	70		Average age, yr. ....	54	78	
Average charge per patient, \$				Average charge per patient, \$			
Total gross revenue. ....	16,107	15,145	- 6.0	Total gross revenue. ....	12,254	12,275	0.2
Pharmacy. ....	1,051	937	-10.8	Pharmacy. ....	873	857	- 1.8
Surgery. ....	5,771	5,926	2.7	Surgery. ....	3,001	3,069	2.3
Laboratory. ....	985	858	-12.9	Laboratory. ....	520	924	77.7
Physical therapy. ....	564	521	- 7.6	Physical therapy. ....	596	462	-22.5
Central service. ....	1,027	856	-16.7	Central service. ....	560	755	34.8
X-ray. ....	398	408	2.5	X-ray. ....	535	668	24.9
DRG 209 Major Joint Procedure				DRG 212 Hip/Femur			
Patients, No. ....	117	116	- 0.9	Patients, No. ....	4	5	25.0
Average length of stay, d. ....	10	8.5	-15.0	Average length of stay, d. ....	8.5	8	- 5.9
Average age, yr. ....	66	67		Average age, yr. ....	11	8	
Average charge per patient, \$				Average charge per patient, \$			
Total gross revenue. ....	17,188	16,513	- 3.9	Total gross revenue. ....	9,600	10,066	4.9
Pharmacy. ....	958	956	- 0.2	Pharmacy. ....	597	501	-16.1
Surgery. ....	7,377	7,725	4.7	Surgery. ....	2,655	3,258	22.7
Laboratory. ....	835	711	-14.9	Laboratory. ....	427	446	4.4
Physical therapy. ....	602	559	- 7.1	Physical therapy. ....	189	168	-11.1
Central service. ....	1,140	896	-21.4	Central service. ....	360	511	41.9
X-ray. ....	247	242	- 2.0	X-ray. ....	356	567	59.3
DRG 210 Hip/Femur‡							
Patients, No. ....	30	37	23.3				
Average length of stay, d. ....	10.5	9.4	-10.5				
Average age, yr. ....	72	82					
Average charge per patient, \$							
Total gross revenue. ....	13,721	13,972	1.8				
Pharmacy. ....	963	1,012	5.1				
Surgery. ....	2,775	2,929	5.5				
Laboratory. ....	1,283	1,339	4.4				
Physical therapy. ....	507	506	- 0.2				
Central service. ....	756	869	14.9				
X-ray. ....	744	712	- 4.3				

\*Inlier population is defined as those patients with a length of stay  $\pm 1$  standard deviation from the average.

†Charges are adjusted for price increases between 1987 and 1988.

‡Hip and femur procedures except major joint procedures, in patients 18 years and older, with complications or comorbidity.

§Hip and femur procedures except major joint procedures, in patients 18 years and older, without complications or comorbidity.

||Hip and femur procedures except major joint procedures, in patients aged 0 to 17 years.

(Washington Post: "\$125 Billion in Waste Alleged in U.S. Hospital, Surgical Costs," *San Francisco Chronicle*, May 4, 1988, p A16). If a total of \$600 billion was spent for health care in 1989, this means that more than 20% of the services provided could be considered expendable. Much of this waste has been trimmed through utilization controls, reducing the amount of unnecessary hospital admissions and non-acute-care hospital days, and substituting less costly outpatient services for inpatient care when clinically appropriate.

Other medical studies have shown that many of the services physicians provide may not be clinically appropriate.<sup>6-8</sup> Studies on the appropriateness of coronary angiography, carotid endarterectomy, endoscopy, coronary artery bypass procedures, and cesarean sections suggest that as many as 25% to 75% of these services have been carried out for inappropriate clinical reasons.

With the continued introduction of new, more advanced, and more expensive technology, another peculiarity has occurred in the way resources are used. While these new technologies provide additional information, there is no concomitant reduction in the use of older technologies, so the costs continue to soar. Do oral cholecystograms, ultrasonograms, and computed tomographic scans need to be done on every patient with possible gallbladder disease?<sup>9</sup> There is still much to be learned about the effective use of health care resources.

## Results and Discussion

The potential for improving efficiency is there; the question is how to make it work. Can we influence positive change by modifying physician behavior?

Going back to the orthopedic project discussed earlier, we compared the results from the preeducation year 1987 with those from the posteducation year 1988 (Table 6). For the sake of analysis, results are reported by DRG groups for inlier cases only—that is, those patients with lengths of stays  $\pm 1$  standard deviation from the average. Most of the results indicate a positive change. Lengths of stay were reduced an average of 14%, pharmacy charges were down 11%, laboratory charges were down 13%, and total average charges per patient were reduced by almost \$1,000.

Our results are consistent with the findings of other studies in the literature. Whereas some studies have shown equiv-

ocal results, others have documented reductions that average 10% to 20% in total charges, lengths of stay, the number of diagnostic studies, and the use of other ancillary services after the introduction of comprehensive physician educational programs.<sup>10-12</sup> It is certainly worth trying (R. Winslow, "AMA, Rand Go After Modern Ill: Unneeded Procedures," *Wall Street Journal*, March 22, 1990, pp B1,6; K. Glenn, "Rising Health Costs Spur Studies, Guidelines on Use of Procedures," *Physician's Financial News*, August 15, 1989, p 2; R. McGuire, "Practice Guidelines in Development," *Medical Tribune*, July 12, 1990, p 13).

In the final analysis, physicians need to become involved as true resource managers to maintain internal control of the system. A more efficient use of resources will benefit all segments of the medical market. Payers will appreciate the financial equity gained from more cost-effective health care spending. Providers and patients should appreciate improvements in quality through more effective treatment and outcome. Society will gain by having more services available for those in need through a more effective allocation of resources.

## REFERENCES

1. Kendel P: Claims analysis firm to sell information comparing medical prices, procedures. *Mod Healthcare* 1988; 18:39
2. Higgins L: Care rationing hits at local level. *Medical World News* 1989 Apr 24, pp 21-23
3. Batchelor G, Esmond T: Maintaining high quality care while controlling costs. *Healthcare Financial Management* 1989 Feb, pp 21-30
4. Rosenstein A: Health economy and resource management: A model for hospital efficiency. *Hosp Health Serv Admin*, 1991; 36: in press
5. Kassirer JP: Our stubborn quest for diagnostic certainty—A cause of excessive testing? *N Engl J Med* 1989; 320:1489-1491
6. Chassin MR, Koseoff J, Park RE, et al: Does inappropriate use explain geographic variations in the use of health care services?—A study of three procedures. *JAMA* 1987; 258:2533-2537
7. Winslow CM, Koseoff JB, Chassin M, Kanouse DE, Brook RH: The appropriateness of performing coronary artery bypass surgery. *JAMA* 1988; 260: 505-509
8. Leape LL, Park RA, Solomon DH, Chassin MR, Koseoff J, Brook RH: Does inappropriate use explain small-area variations in the use of health care services? *JAMA* 1990; 263:669-672
9. Eisenberg JM, Schwartz JS, McCaslin FC, Kaufman R, Glick H, Kroch E: Substituting diagnostic services: New tests only partly replace older ones. *JAMA* 1989; 262:1196-1200
10. Pugh JA, Frazier LM, DeLong E, Wallace AG, Ellenbogen P, Linfors E: Effect of daily charge feedback on inpatient charges and physician knowledge and behavior. *Arch Intern Med* 1989; 149:426-429
11. Burda D: Changing physician practice patterns. *Mod Healthcare* 1989; 19: 18-30
12. Koska M: Physician practices go under the microscope: What execs are learning from physician profiles. *Hospitals* 1990 Feb 20, pp 32-37